(No Model.) 3 Sheets—Sheet 1.

E. MOREAU.

MACHINE HAND ROCK DRILL.

No. 258,100. Patented May 16, 1882.

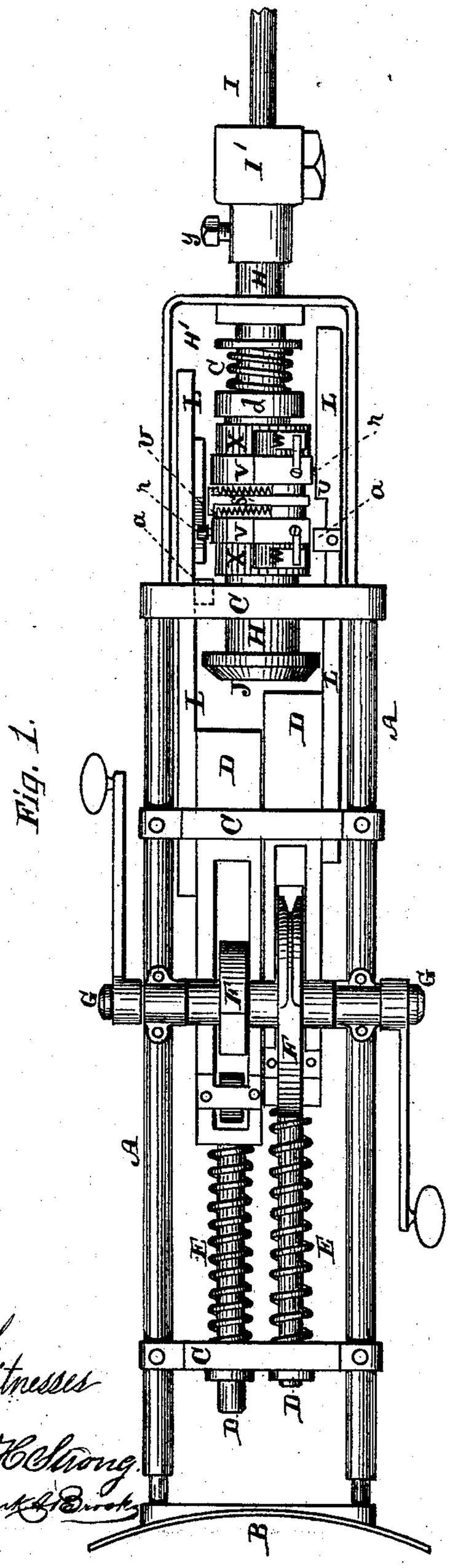

Fig. 1.

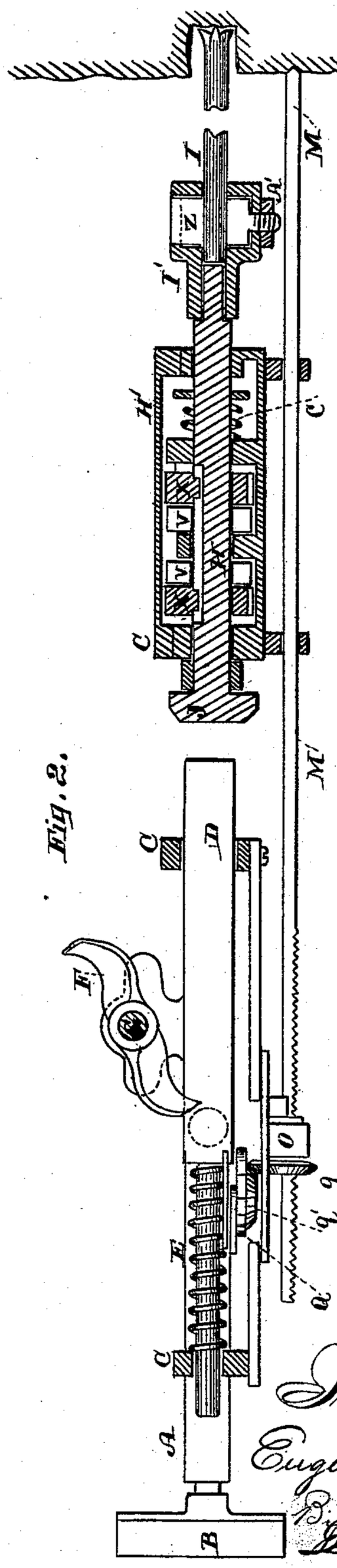

Fig. 2.

Witnesses

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(No Model.) 3 Sheets—Sheet 2.

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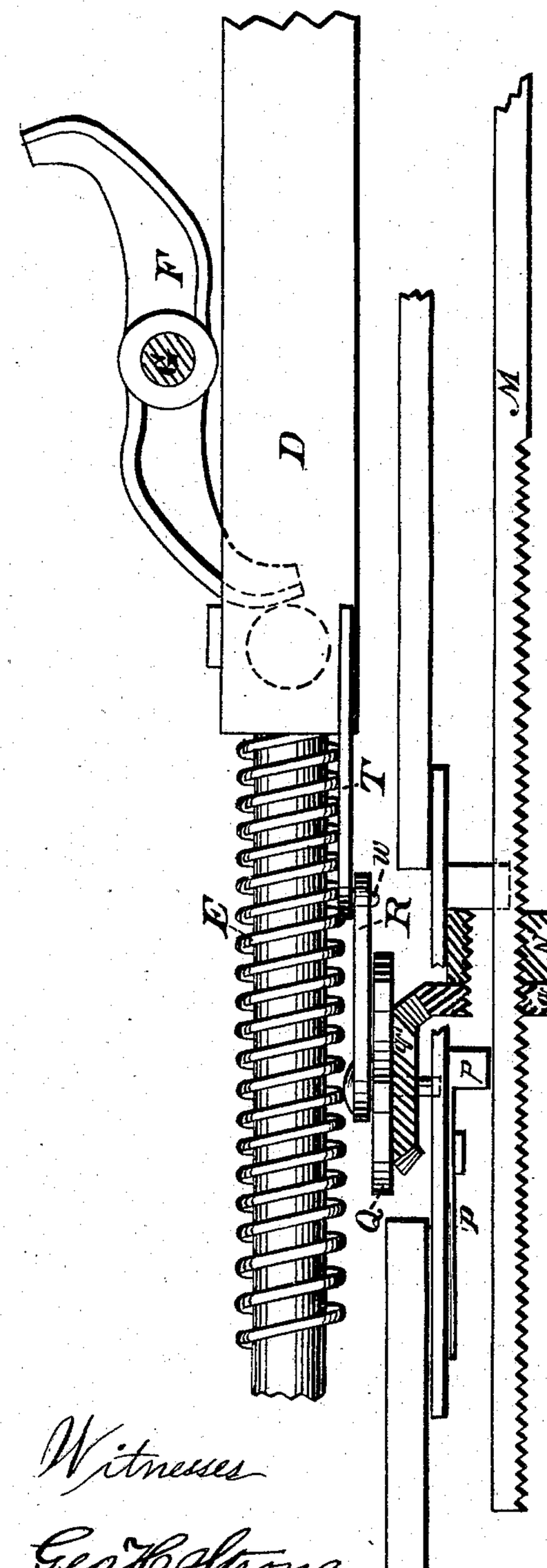

Fig. 3.

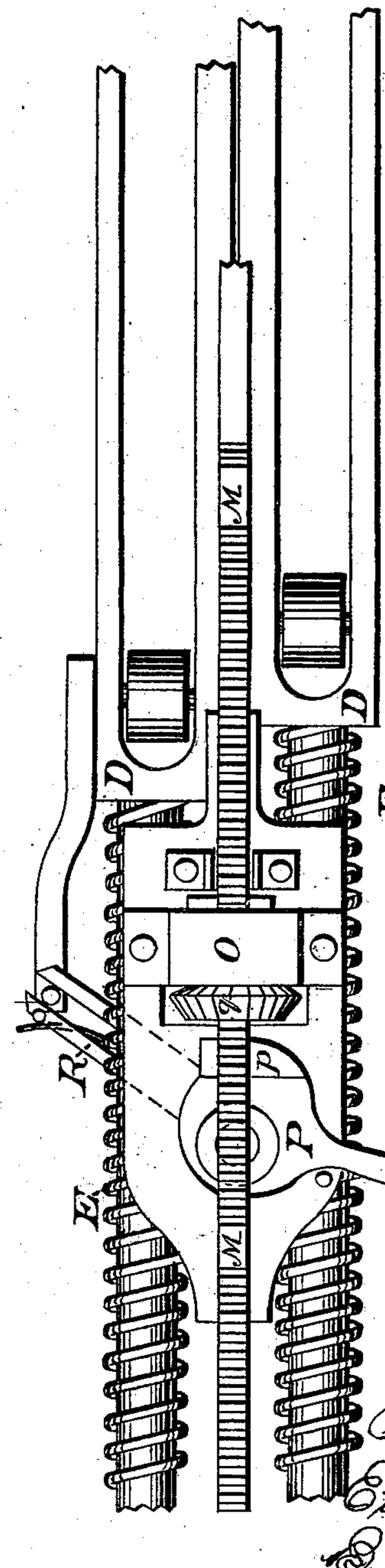

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

E. MOREAU.

MACHINE HAND ROCK DRILL.

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Fig. 5.

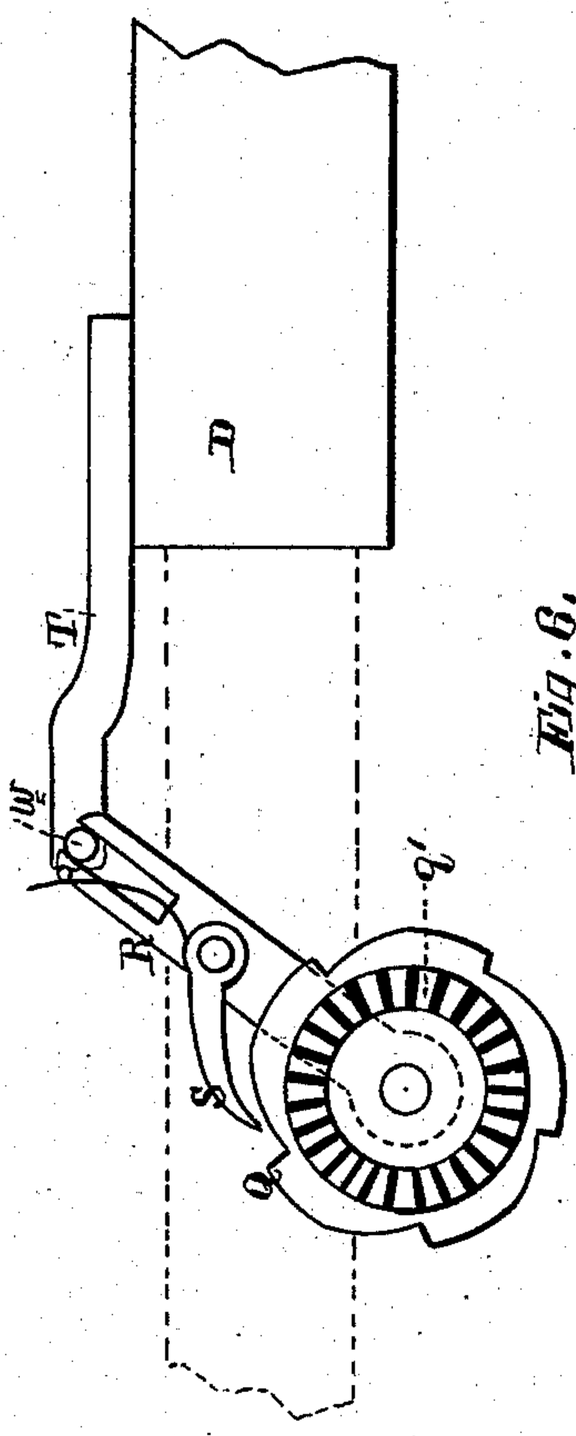

Fig. 6.

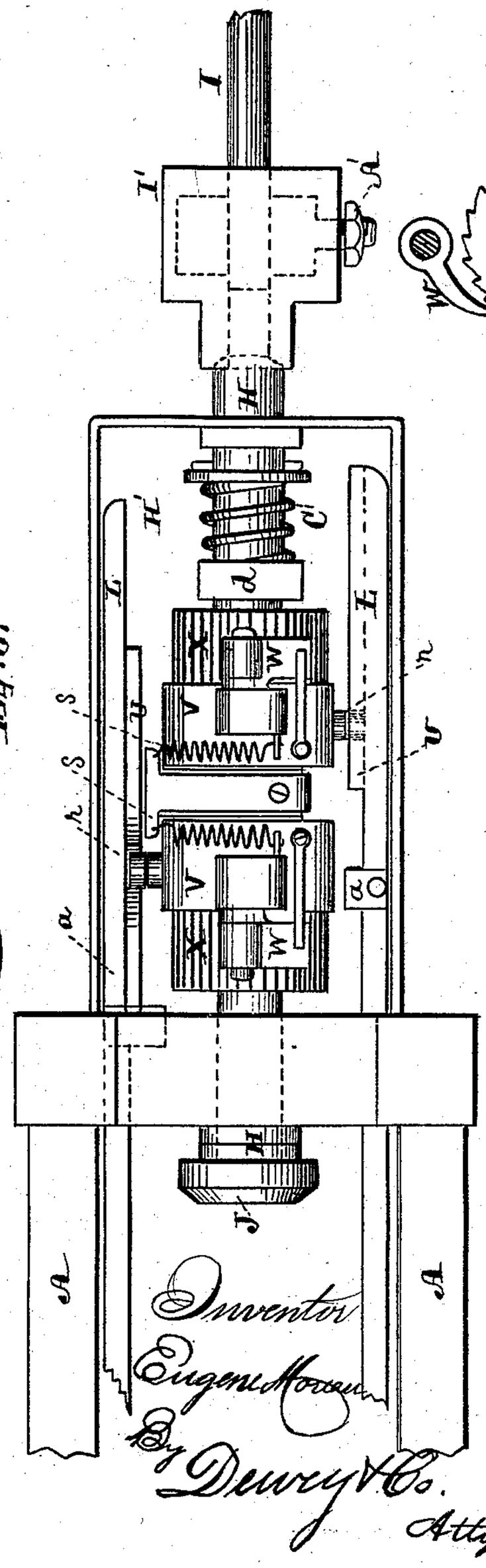

Fig. 8.

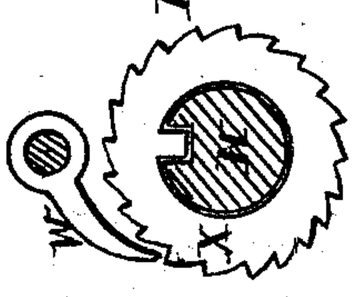

Fig. 7

Witnesses

Geo. H. Strong.

Frank A. Brooks

Inventor

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UNITED STATES PATENT OFFICE.

EUGÈNE MOREAU, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THEODORE W. STERLING, OF SAME PLACE.

MACHINE HAND ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 258,100, dated May 16, 1882.

Application filed November 9, 1881. (No model.)

To all whom it may concern:

Be it known that I, EUGÈNE MOREAU, of the city and county of San Francisco, State of California, have invented new and useful Improvements in Machine Hand Rock-Drills; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to that class of machine hand rock-drills in which a block or hammer is made to strike upon the head of the drill, or upon a device holding the drill, by means of suitable power while the machine is pressed against the rock.

My invention consists in sundry details of construction, as will hereinafter be fully described and claimed.

It further consists in a means for rotating the drill at the time when it is withdrawn and when the force is not all expended in drawing the hammers back, and in certain other and further details of construction necessary to the full and perfect accomplishment of the operation, all of which will hereinafter fully appear, reference being had to the accompanying drawings, in which—

Figure 1 represents a top view of my drill. Fig. 2 is a longitudinal section of same. Fig. 3 shows an enlarged side view of feeding mechanism for supporting-rod. Fig. 4 shows a bottom view of same. Fig. 5 shows a detail of same. Fig. 6 shows an enlarged top view of lifting and rotating mechanism. Figs. 7 and 8 show details of rotating mechanism.

In the operation of machine hand rock-drills it is necessary to deliver a blow upon the drill and also to cause it to rotate. These two results are fully accomplished in various ways; but there is always a difficulty attendant upon the rotating of the drill, which I will now explain.

In drills of the class under consideration the recoil is generally resisted by the body, the weight of which is thrown against the end of the frame, and remains a constant pressure. Therefore, when the blow is delivered and the sharp edge of the drill is driven into the rock, making a cut therein, it is not advisable to revolve the drill without withdrawing it from the cut just made. If it be so rotated, much force is required to do this because of the pressure of the body and because of the necessity of breaking the edges of the cut in order to rotate. In doing this the edge of the drill must necessarily suffer, as the rock acts as a grindstone, so to speak, against which the drill is ground with considerable pressure.

A familiar instance of the proper operation of a drill is seen in the work of a stone-cutter when drilling a hole with the aid of a common hand drill or tool and a hammer. When he delivers his blow he lifts the tool and turns it slightly. Whether this lifting be caused by the recoil or intentionally, it is the very effect desired. This is appreciable in a larger drill, where greater force is exerted; and my first improvement is intended to obviate this difficulty by providing a means for automatically withdrawing or lifting the drill from the bottom of the hole after each blow.

Let A represent a frame; B, the end or plate intended to be pressed against the body; C, the cross-braces; D D, the reciprocating hammers journaled in the cross-braces; E, their springs, by the tension of which power is given said hammers to deliver the blow; F, the cams, and G the cam-shaft, to which power is applied by means of hand cranks.

The front of the frame is formed into a box or casing, H′, having a removable cover, and intended to contain some of the operating mechanism and protect it from dust. Through this casing extends a loosely-journaled rod or spindle, H, the outer end of which is adapted to receive the drill I through the intermediate chuck, I′, the construction of which I will hereinafter explain. It is so journaled in the frame as to have a forward movement when struck on its head J, against which the reciprocating hammers D D are adapted to strike. To the outer sides of the hammers, near their ends, are firmly secured arms or strips L, which extend forward into the casing H′. These strips have inwardly-projecting lugs *a* extending a sufficient distance inwardly to engage with the head J of the spindle H when the hammers are drawn back. These lugs, therefore, being in front of the head J, will, when drawn back, lift the spindle H, with its drill, away from the bottom of the hole at each return-stroke, and give a proper opportunity to rotate the drill,

as I will show hereinafter. In order to return the drill to its place before the blow of the hammer, I place the spiral spring C around the spindle H, which, by being adapted to be compressed between a collar, *d*, and the end of the frame, as shown, forces the spindle forward. Now, when the cams are revolved and the hammers forced back against their springs, their arms or strips L, with their lugs *a*, will engage alternately with the head J of the spindle H and draw said spindle back, and thus lift the drill. Just after the blow of one hammer, after proceeding upon its return and near the end, its arm L comes in contact with the head J of the spindle and picks it up and draws the drill away from the bottom of the hole. When the hammer is released from its cam both hammer and spindle are thrown forward by their respective springs. The spindle, having a much less distance to travel, causes the drill to press against the rock before the hammer strikes the head J, so that the drill is in position when it receives the blow. At the instant the blow is delivered the other hammer picks up the spindle and the same operation is repeated. The drill is thus lifted at every stroke. As I have before explained, the best time to revolve the drill is when thus lifted. In order to accomplish this, I have the cams U upon the inner sides of the forward ends of the arms L. These cams consist of strips the surface or edge of which is a curved incline plane, and they are placed so that one has its cam-edge downward, in order that they may affect the spindle H in the same direction.

Upon the spindle are two loosely-set sleeves, V, having lugs or pins *r*, which are adapted to be engaged by the cams U. The lugs or pins may have their outer ends formed into friction-rollers. The sleeves V have also pawls W, which engage with ratchets X set upon a feather upon the spindle H, whereby the said spindle may have a free forward movement, but be engaged by the ratchets to rotate therewith. Small springs *s*, attached to the sleeves and to an appropriate brace, pull the sleeves V, with their pawls, back to their places after each feed. When the hammers are drawn back they cause the cams U to affect the lugs *r* and turn the pawls W, which feed forward the ratchets X and revolve the spindle and drill. This mechanism is so placed that the effect described is produced at the best possible time, both because the drill is then withdrawn and because the strength of the operator is not all expended in drawing the hammers back, as the rotation happens when one of the hammers has completed its backward stroke and the other has just started to return. At such a time the device requires little power, because one spring has been already compressed and the other is just starting. In order to gain the time at this point necessary to revolve the drill, I construct the points of the cams F more upon a circle, so that after having forced one hammer back to its limit the curve of the point will hold it sufficiently long to allow the rotation of the drill to be accomplished by the other hammer when starting to return. Now, in order that the lifting and rotation of the drill may be effective, it is necessary that some bearing or support be rendered the machine, so that the drill may be lifted and guided or directed with accuracy upon its return.

Under the frame, about the center, is a long rod, M, the forward end of which is designed to press against the face of the rock, as shown. This rod is suitably supported and journaled, that it may have a movement forward and back. It will be seen that when pressed against the face of the rock it supports the forward end of the machine and forms a bearing for it, so that the pressure may be borne by it and the drill relieved sufficiently to allow it to be lifted from the bottom of the hole. It holds the front of the machine rigid and acts as a guide for the drill. Now, it is evident that as the hole in the rock deepens the drill itself is the only part of the machine which can advance.

The frame is held solidly by the guide-rod M. This being the case, the head J of the spindle H would very shortly come in contact with the front of the frame and no longer be able to advance. The way to avoid this is to have the guide-rod M adapted to move backward, so that the whole frame A, instead of the drill, may advance. As before stated, the rod M is suitably journaled to have this sliding play; but I have invented a means for rendering its movement automatic and cause it to occur only when required by the forward progress of the drill.

The guide-rod M is provided upon its rear end with teeth, so that it becomes a rack-bar. This toothed end passes through a nut, N, which is journaled in a bearing, O. The nut N is larger than the rod, and only engages said rod when the latter is forced down upon it. This is done by a lever, P, pivoted as shown, and having a cam, *p*, upon one side. This cam is adapted by the motion of the lever to pass above the rod M and force it down upon the nut N, and to release the rod, so that it may be moved by the hand when necessary. When the rod is locked in the nut it can be moved by the rotation of the latter. The rear side of the nut is provided with a bevel-gear, *q*, with which another bevel-gear, *q'*, engages. This latter forms a part of a ratchet, Q, adapted to revolve toward the rear.

R is a lever having upon its rear end a pawl, S, engaging with the ratchet Q, and having its other end forked. In this fork a lug, *w*, upon the end of an arm, T, plays. The arm T is attached to one side of the hammer D. When the hammer is forced back the arm T causes its lug *w* to push back the forked lever R, by which movement its pawl S feeds the ratchet Q back, which turns the gears *q'* and

q and the nut N, whereby the rod M is moved backward. This does not occur at every stroke, as the length of stroke of the hammer is so fixed that its movement causes the pawl S to move back and forth over the same tooth of the ratchet Q until its stroke is lengthened, when it causes the forked lever R to move forward far enough to cause its pawl S to slip forward over a new tooth. As the hammer has always the same length of return-stroke—that is, it returns to the same point each time—it causes the ratchet to feed with effect, as described. The engagement of the pawl with a new tooth occurs only when the forward stroke of the hammer is lengthened, and this is caused by the forward progress of the drill in the rock. The backward movement of the rod M is therefore automatic, occurring only when the drill has advanced sufficiently to demand its retrogression for the further advancement of itself. It will be seen that this operation is dependent upon the forward progress of the drill, for as the drill advances the forward stroke of the hammer is lengthened, and through the mechanism described the rod M is drawn back. This is the principle of this point of invention, and, using this advancement of the drill, I have shown intermediate mechanism to cause the guide-rod M to recede. I do not confine myself to this particular intermediate mechanism, for that is comparatively unimportant, the essence of the invention being in utilizing the progress of the drill to regulate the retrogression of the guide-rod M and consequent advancement of the drill-frame. Any other intermediate mechanism dependent upon this principle will answer.

It will be necessary to frequently change the drill and to reset the guide-rod M. This may be accomplished by hand readily by moving the lever P and disengaging the rod from the nut N.

I′ is the chuck, secured to the spindle H by the set-screw *y*. It has a hole in its forward end, in which the drill I is inserted. Through one side of the chuck is a bolt, Z, the head of which lies flush with the side, and the end reduced and having screw-threads upon it, upon which a nut, A′, is screwed. A hole is made through the bolt and the drill passes through the hole. Now, when the nut A′ is screwed up it draws the bolt Z in tightly and causes it to force the drill against one side of the chuck and bind it. By unscrewing the nut the bolt is loosened and releases the drill. It is obvious that the chuck could be secured to the spindle in like manner, if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine hand rock-drill, the arrangement and combination of the hammers D D, provided with arms or strips L, having lugs *a*, and the loosely-journaled drill-holding spindle H, with its head J and spring C, substantially as and for the purpose herein described.

2. In a machine hand rock-drill, the combination and arrangement of the hammers D D, having arms or strips L and cams U, and the loosely-journaled drill-holding spindle H, with its sleeves V, having lugs *r*, springs *s*, and pawls W, and the feathered ratchets X, substantially as and for the purpose herein described.

3. In a machine hand rock-drill, the combination and arrangement of the hammers D D, having lugs *a* and cams U, and the loosely-journaled drill containing spindle H, with its head J, spring C, loose sleeves V, with their lugs *r*, springs *s*, and pawls W, and the feathered ratchets X, substantially as and for the purpose herein described.

4. In a machine hand rock-drill, the combination and arrangement of the hammers D D, lifting-cams F F, having their points curved to the arc of a circle, as shown, arms L, with their cams U, and spindle H, with its sleeves V, lugs *r*, and pawls W, and the feathered ratchets X, substantially as and for the purpose herein described.

5. In a machine hand rock-drill having a striking hammer, the combination of the loosely-journaled drill-holding spindle H, threaded rod M, and a means for receding said rod M as the drill advances, consisting of the arm T, attached to the hammer, and having a pin or lug, *w*, the forked lever R, with its pawl S, the ratchet Q, gears *q′* and *q*, and the actuating-nut N, substantially as and for the purpose herein described.

6. In a machine hand rock-drill, the combination of the loosely-journaled drill-holding spindle H, supporting rod M, and intermediate mechanism to cause said rod to recede as the said spindle advances, substantially as and for the purpose herein described.

7. The combination herein of the threaded rod M, actuating-nut N, and locking device, consisting of the pivoted lever P, with its cam *p*, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

Witnesses: EUGÈNE MOREAU.

S. H. NOURSE,

A. G. LAWRENCE.